

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



**(43) International Publication Date
14 October 2004 (14.10.2004)**

PCT

(10) International Publication Number
WO 2004/088727 A2

(51) International Patent Classification⁷: H01L 21/00

Fung [SG/SG]; Blk 475 Sembawang Drive #07-319, 750475 Singapore (SG). **KWANG, Brandon, Kim, Seong** [KR/KR]; Castle Green, Blk 487, #05-13, Yio Chu Kang Road S (KR). **LIM, Cha, Wee** [SG/SG]; 955 Upper Serangoon Road S (SG). **YI-SHENG, Anthony, Sun** [SG/SG]; 19 Fort Road #07-04 S (TW). **HETZEL, Wolfgang** [DE/DE]; Schanzenweg 14, 89564 Nattheim (DE). **THOMAS, Jochen** [DE/DE]; Ottienstr. 46 A, 81827 Munich (DE).

(21) International Application Number: PCT/IB2004/001734

(22) International Filing Date: 2 April 2004 (02.04.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data: 60/459,353 2 April 2003 (02.04.2003) US

(71) **Applicants (for all designated States except US): UNITED TEST AND ASSEMBLY CENTER LTD. [SG/SG]; 5 Serangoon North Avenue 5, 554916, Singapore (SG). IN-FINEON, TECHNOLOGIES [DE/DE]; Balanstrasse 73, 81541 Munich (DE).**

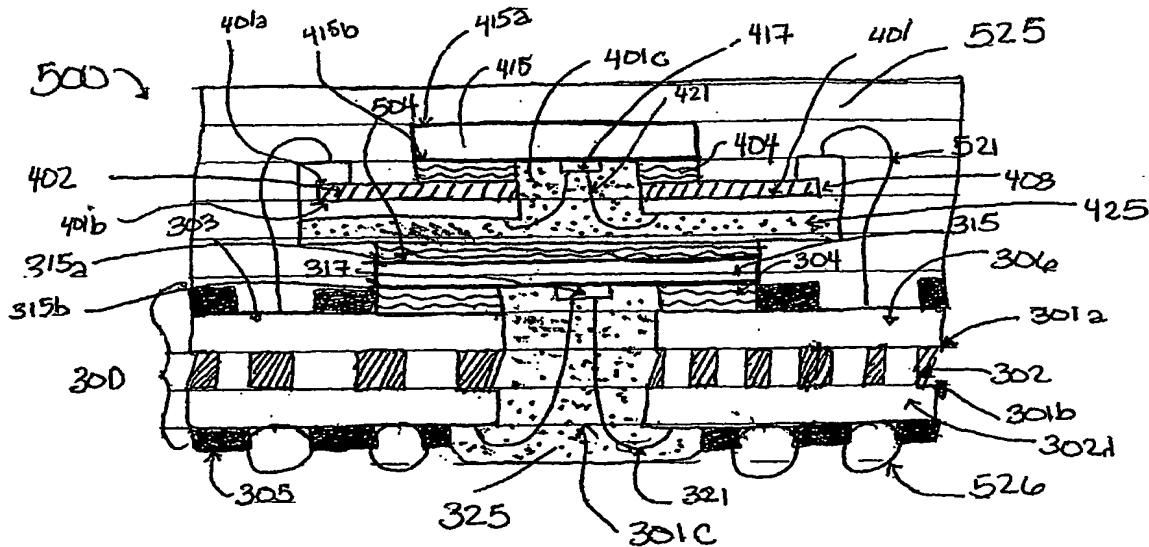
(72) Inventors; and
(75) Inventors/Applicants (for US only): LENG, Chen

(81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) **Designated States** (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),

[Continued on next page]

(54) Title: MULTI-CHIP BALL GRID GRID ARRAY PACKAGE AND METHOD OF MANUFACTURE



(57) **Abstract:** A BGA package is disclosed including a base IC structure having a base substrate, with an opening running lengthwise there through. A first semiconductor chip is mounted face-down on the base substrate so the bond pads thereof are accessible through the opening. The package also includes a secondary IC structure including a secondary substrate, having an opening running there through, and a second semiconductor chip. The second chip is mounted face-down on the secondary substrate so that the bond pads thereof are accessible through the opening in the secondary substrate. An encapsulant fills the opening in the secondary substrate and forms a substantially planar surface over the underside of the secondary substrate. The substantially planar surface is mounted to the first chip of the base IC structure through an adhesive. Wires connect a conductive portion of the secondary IC structure to a conductive portion of the base IC structure.



Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Published:

- *without international search report and to be republished upon receipt of that report*